

WHAT IS CLAIMED IS:

- 1                    1.        A method of animating fluid, comprising:  
2                    determining a fluid surface at a first time value according to a fluid simulation;  
3                    adding at least one spray particle beneath the fluid surface, the spray particle  
4                    having a state derived from the attributes of the fluid surface; and  
5                    moving the spray particle according to at least its state.
- 1                    2.        The method of claim 1, further comprising:  
2                    rendering the fluid surface; and  
3                    rendering the spray particle in response to the spray particle being above the  
4                    fluid surface.
- 1                    3.        The method of claim 1, wherein determining a fluid surface comprises:  
2                    solving a level set equation to determine a zero level corresponding to the  
3                    fluid surface.
- 1                    4.        The method of claim 3, wherein determining a fluid surface further  
2                    comprises:  
3                    simulating a set of fluid particles to determine a state of the set of fluid  
4                    particles at the first time value; and  
5                    solving the level set equation to determine the zero level using the state of the  
6                    set of fluid particles.
- 1                    5.        The method of claim 3, wherein adding at least one spray particle  
2                    comprises:  
3                    solving the level set equation to determine a non-zero level corresponding to a  
4                    boundary surface; and  
5                    adding the spray particle to a boundary region between the fluid surface and  
6                    the boundary surface.
- 1                    6.        The method of claim 1, wherein adding at least one spray particle  
2                    comprises adding the spray particle to a region within a specified depth from the fluid  
3                    surface.

1                   7.       The method of claim 1, wherein moving the spray particle comprises  
2 moving the spray particle in accordance with a ballistic simulation based upon at least the  
3 state of the spray particle.

1                   8.       The method of claim 7, wherein the ballistic simulation includes an  
2 approximation of the force of gravity on the spray particle.

1                   9.       The method of claim 6, further comprising:  
2                   removing the spray particle in response to the spray particle being below the  
3 specified depth from the fluid surface.

1                   10.      The method of claim 5, further comprising:  
2                   removing the spray particle in response to the spray particle being below the  
3 boundary surface.

1                   11.      The method of claim 1, further comprising:  
2                   determining the fluid surface at a second time value according to the fluid  
3 simulation;  
4                   adding at least one additional spray particle beneath the fluid surface, the  
5 additional spray particle having a state derived from the attributes of the fluid surface; and  
6                   moving the spray particle and the additional spray particle according to at least  
7 their respective states.

1                   12.      A method of animating a fluid, comprising:  
2                   determining a state of a set of fluid particles at a first instance of time using a  
3 fluid simulation;  
4                   defining a fluid surface from the state of the set of fluid particles;  
5                   defining a boundary region between the fluid surface and a specified depth  
6 from the fluid surface;  
7                   adding a plurality of spray particles to the boundary region, wherein the  
8 plurality of spray particles is assigned a state based derived from the state of the set of fluid  
9 particles;  
10                  moving the plurality of spray particles according to at least the state of the  
11 plurality of spray particles; and

12 removing a portion of the plurality of spray particles in response to the portion  
13 of the plurality of spray particles being located below the specified depth from the fluid  
14 surface.

1 13. The method of claim 12, further comprising:  
2 rendering the fluid surface; and  
3 rendering a second portion of the plurality of spray particles.

1 14. The method of claim 13, wherein the second portion of the plurality of  
2 spray particles is located above the fluid surface.

1 15. The method of claim 12:  
2 wherein determining the fluid surface comprises solving a level set equation  
3 for a zero level corresponding to the fluid surface; and  
4 wherein determining the boundary region comprises solving the level set  
5 equation for a non-zero level corresponding to a surface at the specified depth from the fluid  
6 surface.

1 16. The method of claim 12, wherein moving the plurality of spray  
2 particles comprises:  
3 moving the plurality of spray particles in accordance with a ballistic  
4 simulation.

1 17. An information storage medium having a set of instructions adapted to  
2 direct an information processing device to perform an operation comprising the steps of:  
3 determining a fluid surface at a first time value according to a fluid simulation;  
4 adding at least one spray particle beneath the fluid surface, the spray particle  
5 having a state derived from the attributes of the fluid surface; and  
6 moving the spray particle according to at least its state.

1 18. The information storage medium of claim 17, further comprising:  
2 rendering the fluid surface; and

3                    rendering the spray particle in response to the spray particle being above the  
4 fluid surface.

1                    19.     The information storage medium of claim 17, wherein determining a  
2 fluid surface comprises:

3                    solving a level set equation to determine a zero level corresponding to the  
4 fluid surface.

1                    20.     The information storage medium of claim 19, wherein determining a  
2 fluid surface further comprises:

3                    simulating a set of fluid particles to determine a state of the set of fluid  
4 particles at the first time value; and

5                    solving the level set equation to determine the zero level using the state of the  
6 set of fluid particles.

1                    21.     The information storage medium of claim 19, wherein adding at least  
2 one spray particle comprises:

3                    solving the level set equation to determine a non-zero level corresponding to a  
4 boundary surface; and

5                    adding the spray particle to a boundary region between the fluid surface and  
6 the boundary surface.

1                    22.     The information storage medium of claim 17, wherein adding at least  
2 one spray particle comprises adding the spray particle to a region within a specified depth  
3 from the fluid surface.

1                    23.     The information storage medium of claim 17, wherein moving the  
2 spray particle comprises moving the spray particle in accordance with a ballistic simulation  
3 based upon at least the state of the spray particle.

1                    24.     The information storage medium of claim 23, wherein the ballistic  
2 simulation includes an approximation of the force of gravity on the spray particle.

1                    25.     The information storage medium of claim 22, further comprising:  
2 removing the spray particle in response to the spray particle being below the  
3 specified depth from the fluid surface.

1                   26.     The information storage medium of claim 21, further comprising:  
2                   removing the spray particle in response to the spray particle being below the  
3 boundary surface.

1                   27.     The information storage medium of claim 17, further comprising:  
2                   determining the fluid surface at a second time value according to the fluid  
3 simulation;  
4                   adding at least one additional spray particle beneath the fluid surface, the  
5 additional spray particle having a state derived from the attributes of the fluid surface; and  
6                   moving the spray particle and the additional spray particle according to at least  
7 their respective states.

1                   28.     A tangible media including a first image including a fluid surface and a  
2 spray particle each having a first state, and a consecutive image including the fluid surface  
3 and the spray particle each having a second state, wherein the first and second states of the  
4 spray particle are created according to the method of claim 1.

1                   29.     A tangible media including a first image including a fluid surface and a  
2 plurality of spray particles each having a first state, and a consecutive image including the  
3 fluid surface and the plurality of spray particles each having a second state, wherein the first  
4 and second states of the plurality of spray particle are created according to the method of  
5 claim 12.